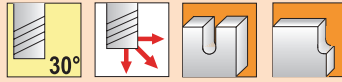


TOLERANCES		
$d_1$	+.000" -.002" (+.000 -.050mm)	
$d_2$	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Technical information:  
page 228, 230

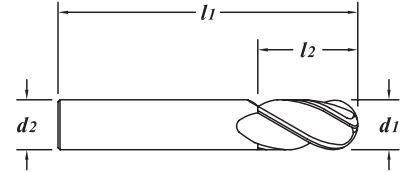


**320MA (920MA metric) - 2 Flute**  
**323MA (923MA metric) - 3 Flute**  
**330MA (930MA metric) - 4 Flute**  
 .0312" - .3150"  
 (0.792mm - 8.000mm)

END MILLS

## Standard Length - Ball End - TiALN Coated

- Solid submicron grain carbide end mill - center cutting
- Dry or semi-dry machining
- Up to 40% faster than uncoated
- Extremely versatile
- Uncoated - page 171
- TiN Coated - page 173
- TiCN Coated - page 174



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	$d_1$ † Diameter		$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Metric								
16017	17017	18017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	15.46	14.78	14.11	13.44
47017	38017	48017	.0394		1.000	3.0	38	4	16.11	15.41	14.71	14.01
16027	17027	18027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	15.46	14.78	14.11	13.44
47027	38027	48027	.0591		1.500	3.0	38	6	16.11	15.41	14.71	14.01
16037	17037	18037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	14.73	14.09	13.45	12.81
16047	17047	18047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	14.73	14.09	13.45	12.81
47037	38037	48037	.0787		2.000	3.0	38	8	15.34	14.67	14.01	13.34
16057	17057	18057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	14.19	13.57	12.96	12.34
47047	38047	48047	.0984		2.500	3.0	38	12	14.79	14.15	13.50	12.86
16067	17067	18067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	14.19	13.57	12.96	12.34
47057	38057	48057	.1181		3.000	3.0	38	12	13.65	13.06	12.46	11.87
16077	17077	18077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.11	12.54	11.97	11.40
47067	38067	48067	.1378		3.500	4.0	50	12	18.88	18.06	17.24	16.42
16087	17087	18087	.1406	9/64"	3.571	3/16"	2"	9/16"	18.10	17.31	16.53	15.74
16097	17097	18097	.1562	5/32"	3.967	3/16"	2"	9/16"	18.10	17.31	16.53	15.74
47077	38077	48077	.1575		4.000	4.0	50	14	17.19	16.45	15.70	14.95
16107	17107	18107	.1719	11/64"	4.366	3/16"	2"	9/16"	18.10	17.31	16.53	15.74
47087	38087	48087	.1772		4.500	5.0	50	14	22.39	21.42	20.44	19.47
16117	17117	18117	.1875	3/16"	4.763	3/16"	2"	5/8"	16.49	15.77	15.06	14.34
47097	38097	48097	.1969		5.000	5.0	65	16	22.94	21.95	20.95	19.95
16127	17127	18127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	23.26	22.25	21.24	20.23
16137	17137	18137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	23.26	22.25	21.24	20.23
16147	17147	18147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	23.26	22.25	21.24	20.23
47107	38107	48107	.2362		6.000	6.0	65	19	23.39	22.37	21.36	20.34
16157	17157	18157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	22.49	21.52	20.54	19.56
16167	17167	18167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	34.89	33.37	31.86	30.34
47117	38117	48117	.2756		7.000	7.0	65	22	31.10	29.74	28.39	27.04
16177	17177	18177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	34.89	33.37	31.86	30.34
16187	17187	18187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	34.89	33.37	31.86	30.34
16197	17197	18197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	30.49	29.16	27.84	26.51
47127	38127	48127	.3150		8.000	8.0	65	22	31.63	30.25	28.88	27.50

continued →

**320MA (920MA metric) - 2 Flute (continued)**

**323MA (923MA metric) - 3 Flute (continued)**

**330MA (930MA metric) - 4 Flute (continued)**

.3281" - 1.000"  
(8.334mm - 25.400mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	$d_1$ † Diameter		$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Metric								
16207	17207	18207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	40.27	38.52	36.77	35.02
16217	17217	18217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	40.27	38.52	36.77	35.02
47137	38137	48137	.3543		9.000	9.0	65	22	36.97	35.37	33.76	32.15
16227	17227	18227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	40.27	38.52	36.77	35.02
16237	17237	18237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.60	34.06	32.51	30.96
16247	17247	18247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	48.82	46.70	44.57	42.45
47147	38147	48147	.3937		10.000	10.0	70	25	42.99	41.12	39.25	37.38
16257	17257	18257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	48.82	46.70	44.57	42.45
16267	17267	18267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	48.82	46.70	44.57	42.45
47157	38157	48157	.4331		11.000	11.0	75	25	44.78	42.83	40.89	38.94
16277	17277	18277	.4375	7/16"	11.113	7/16"	2-3/4"	1"	43.06	41.18	39.31	37.44
16287	17287	18287	.4531	29/64"	11.509	1/2"	3"	1"	66.22	63.34	60.46	57.58
16297	17297	18297	.4688	15/32"	11.908	1/2"	3"	1"	66.22	63.34	60.46	57.58
47167	38167	48167	.4724		12.000	12.0	75	25	63.31	60.56	57.80	55.05
16307	17307	18307	.4844	31/64"	12.304	1/2"	3"	1"	66.22	63.34	60.46	57.58
16317	17317	18317	.5000	1/2"	12.700	1/2"	3"	1"	60.73	58.09	55.45	52.81
47177	38177	48177	.5512		14.000	14.0	88	32	92.10	88.10	84.09	80.09
16327	17327	18327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	88.31	84.47	80.63	76.79
16337	17337	18337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.69	92.49	88.28	84.08
47187	38187	48187	.6299		16.000	16.0	88	38	100.89	96.50	92.12	87.73
16347	17347	18347	.6875	11/16"	17.463	3/4"	4"	1-1/2"	154.89	148.16	141.42	134.69
47197	38197	48197	.7087		18.000	18.0	100	38	144.84	138.55	132.25	125.95
16357	17357	18357	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.66	132.63	126.60	120.57
47207	38207	48207	.7874		20.000	20.0	100	38	196.24	187.70	179.17	170.64
47217	38217	48217	.8661		22.000	22.0	100	38	215.57	206.20	196.82	187.45
16367	17367	18367	.8750	7/8"	22.225	7/8"	4"	1-1/2"	220.29	210.72	201.14	191.56
47227	38227	48227	.9843		25.000	25.0	100	38	224.91	215.13	205.35	195.57
16377	17377	18377	1.000	1"	25.400	1"	4"	1-1/2"	236.72	226.42	216.13	205.84